October 1998

Demand Uncertainty and Price Maintenance

David Flath and Tatsuhiko Nariu*

*Flath: Department of Economics, NCSU, Raleigh, NC 27695-7506, USA. Email:david_flath@ncsu.edu; and Nariu: Faculty of Economics, Kyoto University, Kyoto, Japan.

Abstract

When retailers must commit to shipment quantities prior to resolution of demand uncertainty, manufacturer stipulation of a minimum retail price is likely to be profitable for the manufacturer, and not damaging to the retailers. The reason is simple: If demand turns out to be low, the unfettered market-clearing price can lie below the price that maximizes total sales revenue. A minimum retail price that is binding in the low demand state can thus increase total revenue even though it saddles retailers with unsold merchandise. This "new" insight of Deneckere, Marvel, and Peck is actually a straightforward generalization of the model of full manufacturer reimbursement for returns developed in Flath and Nariu (1989). The ubiquity of full reimbursement for returns in Japan even though it is in theory merely a second-best way of achieving minimum retail price stipulations, reveals important aspects of manufacturer maintenance of retail prices having to do with enforcement problems, the allocation of risk-bearing and economic incentives. These aspects of resale price maintenance are relevant to the normative evaluation of the special exemptions for RPM that Japan's Fair Trade Commission has long maintained but is now phasing out.

More on Demand Uncertainty and Price Maintenance

In a recent paper Raymond Deneckere, Howard P. Marvel, and James Peck (1997) argue that when retailers must commit to shipment quantities prior to resolution of demand uncertainty, manufacturer stipulation of a minimum retail price is likely to be profitable for the manufacturer, and not damaging to the retailers. The reason is simple: If demand turns out to be low, the unfettered market-clearing price can lie below the price that maximizes total sales revenue. A minimum retail price that is binding in the low demand state can thus increase total revenue even though it saddles retailers with unsold merchandise. In the following paragraphs, we first develop a simple algebraic example that, among other things, exposes the close correspondence between this argument and analysis of the peak-load pricing problem. We then discuss some considerations bearing upon the manufacturer's choice among the different ways of curbing price discounting by independent retailers. Finally, we offer some specific empirical examples from Japan in which the argument may apply.

We start with the algebraic example that ties the Deneckere, Marvel and Peck argument to the phenomenon known as peak-load pricing, and that is also the basis for some other points. Let the linear demand curve for some good have vertical intercept Y, and let the demand curve have slope $-b_H$ with probability θ, and slope $-b_L$ with probability $1-\theta$, where $b_L > b_H$:

$$\text{price} = \begin{cases} p_H = Y - b_H x_H, \text{ with probability } = \theta \\ p_L = Y - b_L x_L, \text{ with probability } = (1-\theta) \end{cases}$$

Suppose that a risk-neutral and vertically-integrated manufacturer must produce before realization of the stochastic demand just described. Suppose further that the unit cost equals c. The manufacturer solves the problem:

$$\max_{Q} \quad \text{expected profit} = \theta(Y - b_H x_H)x_H + (1-\theta)(Y - b_L x_L)x_L - cQ, \qquad \text{s.t. } x_H \le Q, \text{ and } x_L \le Q.$$

The manufacturer will not allow the price to fall below the revenue maximizing level Y/2 even if it results in some output remaining unsold. But the self-imposed price floor of Y/2 is only binding for some combinations of the parameters c/Y, θ, b_L and b_H. Specifically, if $(b_L - b_H)/b_L \ge c/(Y\theta)$, then the firm maximizes its expected profit by producing $(Y - c/\theta)/2b_H$, but only selling the smaller amount $Y/2b_L$ at the price Y/2 in the low demand state, while selling all at the price $(Y + c/\theta)/2$ in the high demand state. If, on the other hand, $(b_L - b_H)/b_L < c/(Y\theta)$, then the firm produces $(Y-c)/(2[b_L(1-\theta) + b_H\theta])$, and sells all at the corresponding state-dependent market-clearing prices. To state it formally, the solution to the manufacturer's problem is:

$$
Q^* = \begin{cases} (Y-c/\theta)/2b_H = x_H^* \geq x_L^* = Y/2b_L, & \text{if } (b_L-b_H)/b_L \geq c/(Y\theta) \\ (Y-c)/(2[b_L(1-\theta)+b_H\theta]) = x_H^* = x_L^*, & \text{if } (b_L-b_H)/b_L < c/(Y\theta) \end{cases}
$$

Analytically, this is exactly the same as the familiar peak-load pricing problem, in which a firm that can adjust its prices in conjunction with time-varying demands must decide upon how much productive capacity to install. Depending upon the parameters, some installed capacity may remain idle in the low demand state. Refer, for example, to Tirole (1988), exercise 1.6, p. 71.

The relevance of all this to manufacturer stipulation of a minimum retail price is immediate. In the case of a manufacturer confronting the same situation as above but selling to an atomistic and risk-neutral retailing industry whose sole cost consists of purchases from it, the manufacturer attains the first-best result just described, either by accepting returns of unsold merchandise at the price Y/2 or, equivalently, by stipulating minimum retail price Y/2. The manufacturer lowers its wholesale price sufficiently that the retail industry just accepts the full supply Q*.

The condition, $(b_L-b_H)/b_L \geq c/(Y\theta)$, encapsulates the factors contributing to the likelihood that the manufacturer will contrive to leave some output unsold in the low demand state, that is, will curb price discounting in the low demand state. The factors contributing to this are low unit costs in relation to the intercept of the demand curve $c/Y<<$, low probability of realization of the low demand state $(1-\theta)<<$, and great variation between the low demand and high demand state $(b_L-b_H)/b_L>>$.

Full manufacturer reimbursement for returns, as analyzed in Flath and Nariu (1989), amounts to a fixed pricing policy: $p_L=p_H$. In the present context, it emerges only if unit cost c equals zero, in which case $p_L^*=p_H^*=Y/2$. For c>0, full reimbursement for returns does not achieve the manufacturer's first-best. Nevertheless, one can point to several actual examples of full reimbursement for returns. A "full returns policy" is the usual practice for newspapers, magazines and books in many countries including the US, as documented in OECD (1997). And in Japan, full reimbursement for returns seems to be common for many other products, too. Why? Reflections upon this question prompt several observations on enforcement problems, the allocation of risk-bearing, and the economic incentives, under alternative vertical arrangements.

Consider the problem of enforcement. On this topic, Deneckere, Marvel and Peck (1997, f.n. 10, p. 622) state only that, "Returns policies may be prohibitive either because of retailer moral hazard or the costs of administering such systems." This warrants a closer look. Reimbursing for unsold goods can rest on the physical return of the goods or proof of the goods' destruction (for example return of the covers of paperback books). But to enforce minimum price stipulations, the manufacturer must monitor the actual details of transactions that the parties involved might wish to conceal. Perhaps the manufacturer can easily detect advertised price discounting. But in that case the authorized retailer can make illicit sales to an unauthorized retailer who actually advertises the retail discount. Even though the manufacturer will in that case detect violation of the RPM agreement, he will not necessarily know the identity of the violator. On these grounds, minimum resale price stipulations actually seem more costly than return policies for the manufacturer to administer and enforce. There are exceptions, and it must be these that Deneckere et al have in mind. For instance, what if the good in question is a service, rather than a commodity, such as the viewing of a motion picture, or lunchtime meals in a franchise restaurant? For such services, “returns” of unsold goods are essentially meaningless, but minimum price stipulations can still have the stated motivation. Another exception to the usual presumption that returns policies are less costly to administer than minimum resale price stipulations is the instance in which the manufacturer desires that the retailers retain their stocks of unsold goods for resale at a later date, which precludes the physical return or actual destruction of the unsold goods.

Besides the question of enforcement, full and partial returns, and RPM, also differ in how they divide risk between manufacturer and retailers, and in how they structure economic incentives. Under a full returns system the manufacturer bears all the risk and the retailers none. A minimum resale price stipulation places all the risk on the retailers. And a partial returns system divides the risk between the manufacturer and the retailers. If retailers are best organized as sole proprietorships while manufacturers are organized as joint stock companies, then the full returns system achieves the superior allocation of risk. This can be one reason behind actual examples of full returns systems, but there is another reason as well: To better exploit the manufacturer’s private information regarding the demand. Only the one that bears the risk of unsold merchandise has an economic incentive to collect private information about demand, and act appropriately. A manufacturer who fully reimburses retailers for unsold merchandise must itself determine shipment quantities. By the same token, only if retailers are fully insulated from the risk of unsold merchandise, can they be confident that the manufacturer’s shipments to them are based on the manufacturer’s own best estimates regarding the likely future demand. If the manufacturer’s information regarding the likely future demand is superior to the retailers’ then a full return system is indicated, but if retailers’ information is superior then minimum retail price stipulations might be indicated even if it entails higher risk-bearing costs than would a full or partial returns system.

The Nintendo example cited by Deneckere et al illustrates the importance of asymmetric information. Nintendo of America first instituted a full return system, only later, apparently instituting RPM (Sheff (1993), p. 188). In 1985, Nintendo, after successfully marketing its games in Japan, believed that the likely demand for the game in the US would also be great. But American retailers, mindful of the recent failure of Atari video games, did not believe that the demand for Nintendo games would be great. Only a policy of full reimbursement for returns could induce American retailers to accept shipments of Nintendo games. By 1988, Nintendo games were selling well and American retailers requested shipment of 110 million game cartridges but Nintendo supplied only 33 million (Sheff (1993), p. 194). Only after this time did Nintendo switch its policy to one in which retailers were obliged to pay for shipments within ninety days of receiving them and, possibly, were required to observe minimum retail prices stipulated by it. Deneckere et al (1997, pp.635-6) suggest that the minimum price stipulation was, in fact, binding in 1990, a year in which the prices of the games fell significantly below their levels in prior years (It is unclear whether the price stipulation pertained to the game cartridges or only to the game system, the unit used to play the cartridges). In 1991, Nintendo consented to desist from further RPM (114 F.T.C. 702, (1991)).

The Nintendo case is a fairly convincing instance of a manufacturer acting to curb price discounting by independent retailers, simply to preserve revenues in low demand states. One would like to discover other examples. The instances of officially authorized resale price maintenance under the antimonopoly laws of Japan offer some plausible candidates.[1] The products for which RPM was specifically authorized in Japan have included shampoo, hairdye, toothpaste, toilet soap and laundry detergent (1953-1973), caramel candy (1954-1966), men's white T-shirts (1959-1966), and non-prescription medicines (1953-). Every item on this list can be held in retailers' inventory for later resell. All of them are branded, advertised products, presumably therefore having relatively large price-cost margins (low unit costs in relation to the intercept of the demand curve). All of this, as just discussed, fits the Deneckere et al explanation. And there is more. Although RPM was authorized for specific brands of laundry detergent for two decades, it was apparently only actually enforced in the very last two years in which authorized, 1972-1973. This also fits the Deneckere et al argument, for again, as just discussed, minimum price stipulations that are merely to curb price discounting in low demand states, are more likely to be profitable if low demand is less likely. In other words, it is natural to expect that a minimum price stipulation would often, or even usually, not even be binding. In short, we think the Deneckere et al explanation is the correct one for all these various examples of RPM in Japan.

The Fair Trade Commission of Japan is currently phasing out all special exemptions from the usual prohibitions of RPM. This might or might not be welfare enhancing. For instance, if returns policies are not practical, then the alternative to RPM is the regime in which price adjusts to the market-clearing level (flexible pricing). Consider a specific instance. In the algebraic example, if $(b_L-b_H)/b_L \geq \frac{1}{2} + c/(Y\theta)$, then, under the flexible pricing regime, the monopolist would anticipate price equal to zero in the low demand state, and, in anticipation of this, would produce exactly the same quantity as under the RPM regime. The flexible pricing regime is, in this particular instance, superior from the standpoint of social welfare because it avoids the wasteful discarding of output in the low demand state. But the social welfare ranking of the alternative regimes is, in general, ambiguous, for with other parameters (in other words, for $(b_L-b_H)/b_L < \frac{1}{2} + c/(Y\theta)$), the monopolist supplies less output under the flexible pricing regime than under the RPM regime, and in some such instances, the RPM regime confers higher social welfare.

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[1]Although resale price maintenance agreements are in principle a violation of Japan's antimonopoly law (section 19), there have been two special exceptions. First, resale price maintenance is explicitly authorized for copyrighted works (Antimonopoly law of Japan, section 24-2(4)). Second, the Fair Trade Commission of Japan, the agency delegated with enforcement of the antimonopoly law, may (under the Antimonopoly Law, section 24-2(1)), at the request of a manufacturer, designate specific branded products as exempt from the usual prohibitions on resale price maintenance. As a matter of policy, the JFTC is phasing out such exemptions. Furthermore, amendments to the antimonopoly law that would remove the special authorization of RPM for copyrighted works are also under serious discussion in Japan. For relevant details on the antimonopoly laws of Japan refer to Flath (1989).

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